

collaborators have shown, developed, probably in late geological times, the numerous species and varieties which are found wild there to-day, and which formed the raw material from which the early immigrant selected the plants he subsequently learned to cultivate.

In districts such as these, life is a more or less continuous struggle in a field in which man's action is in the main restricted by environmental factors over which he has no control: the temperatures of air and soil.

Most of the potato-growing areas lie between  $7^{\circ}$  N. of the equator and  $43^{\circ}$  S., which enables the native cultivator, if he wishes, to raise two or more crops each year,<sup>1</sup> the limiting factor being the danger of night frosts in the higher altitudes, as, for example, in the Puño region of Lake Titicaca, where there is reason to believe the earliest civilization took root. Here, severe night frosts are common, and the Indian cultivator is said to be fortunate if he secures one harvest out of five free from damage.

To meet this emergency, the natives cultivate certain species of potato which withstand several degrees Fahrenheit more frost than do our own. The Russian investigators<sup>2</sup> have identified and named these, of which the chief are *Solanum ajanhuiri* and *S. juzepczukii*. Both of these, though very similar to our own potato in external characters, differ by reason of their chromosome formulae; that of the first being  $2n=24$ , and of the second  $2n=36$ , as against  $2n=48$ , the formula of the potato of Europe and of most of those in cultivation in South America. Both these species are sexually sterile, though *S. ajanhuiri* may occasionally function as a female. This latter species occurs as two cultivated varieties, one with white, the other with purple tubers. An important feature of these frost-resistant potatoes is that they are strictly adapted to the short-day environment of these latitudes.

There is good reason to believe that *S. juzepczukii* is a hybrid derived from a cross of two distinct species, one of which was *S. acaule*, a rosette type bearing few and small tubers but capable of withstanding  $10^{\circ}$  C. of frost. It is probable, as has already been suggested, that this cross took place in nature, but the fact that the hybrid offspring should have been selected and cultivated implies a high degree of intelligence on the part of the native cultivator as well as a sustained agricultural experience. Were we to assume, as indeed we have no right to do, that the original hybridizations were made by man, and the offspring selected, then we must needs picture a stage of agricultural development comparable with that of the nineteenth century in Europe. The bare facts are enough, construe them how we will: the native Indian cultivator did select certain

<sup>1</sup> Generally one crop is grown. — Ed.

<sup>2</sup> See particularly: Bukasov, S. M. (1930). The cultivated plants of Mexico, Guatemala and Colombia, Ch. 14, *Bull. Appl. Bot. Genet. and Pl. Breed.*, Suppl. 47, 191-226; Juzepczuk, S. W. and Bukasov, S. M. (1929). A contribution to the question of the origin of the potato. *Proc. USSR Congr. Genet. Pl. & Animal Breed.*, vol. 3, 593-611; Rybin, V. A. (1930). Karyologische Untersuchungen am einigen wilden und ein heimischen Kultivierten Kartoffeln Amerikas. *Z. indukt. Abstamm. u. Vererb.*, vol. 53, 313-54. — Ed.

weeds—for that is all the wild potatoes are in these lands—recognized their individual habits, and found that one might suit the conditions of a temperate valley, another that but little below the snow-line in the bleakest *puna*. Whatever our conclusions may be as to the general state of culture, mental and economic of the natives of the sierra, we are at least justified in assuming that pre-Columbian agriculture of Peru had attained a level sufficiently high to justify the assumption that very many generations must have elapsed since the first contact with the potato was made.

The frost-resistant species which we have mentioned and which are those mainly grown at the highest levels are insipid or bitter and are to-day reserved for the manufacture of *chuño*.

In order to enjoy palatable potatoes, the peasant to-day, as probably his forefathers for many centuries before him, cultivated other varieties, some closely akin to our own, and these were naturally given the more favoured locations. This may be regarded as the second stage in the evolution of the domestic potato.

One variety still grown, which is a great favourite, is *Solanum gonio-calyx* or the *Papa amarilla*, a yellow-fleshed sort, of excellent flavour, with the chromosome formula  $2n=24$ . We have evidence from the pottery found in the early tombs that this variety, or one very like it, was in use about A.D. 800, if not earlier.<sup>1</sup> This, again, must be regarded as a case of conscious selection, for the common potato of the Andes has the chromosome formula  $2n=48$ . Of this type, the cultivated *Solanum andigenum* potato, there are some hundreds of varieties grown by native agriculturists to-day, differing one from another, as do our own at home, in colour, shape, season and taste. Mrs Clarence Woods, in her entertaining book, *High Spots on the Andes*, tells how recently at La Paz, at the Potato Fair, eighty-nine named varieties were exhibited, which illustrates the horticultural skill of the native cultivators no less than the great importance of the potato in their country. Because dependence on the potato led to outstanding improvements in its cultivation, we must not shut our eyes to the danger which such dependence on an easily raised staple crop may bring in its train. As in Ireland, where the peasantry had built up their whole economy on the potato, the blight of 1845 and 1846 brought about its collapse, with untold misery, so on the altiplano, failure of the crop frequently threatened the native with starvation or emigration.

Cieza tells us that the natives of the Collao on the uplands south of Cuzco, where in his day no maize was grown, were happy and contented when the potato harvest was good, but when it was bad their distress was great. The Indian, as we have seen, went far to solve the dilemma by making use of his worst enemy, the frost.

<sup>1</sup> Safford, W. E. (1925). The Potato of Romance and of Reality. *J. Heredity*, vol. xvi, pp. 113-84 and 217-30.

its ability to unite all parties, and exercise its power in the realm of current politics. The movement grew daily in strength, by means which were constitutional in the letter, but insufficiently so in the spirit, to do more than camouflage the obvious determination of the people to secure by force of arms what they might fail to obtain by persuasion.

The spirit of the French Revolution ran like wine in the veins of the leaders of the Irish Nationalists who, fired with hope, were now ready to emulate the success achieved by the colonists in the American War, so many of whom were but recently their neighbours in Ireland. It was not long before their example inspired the majority of the Irish people, uniting for the time, Protestant Whigs and Catholic Nationalists, in one common endeavour. The movement found its leader in Theobald Wolf Tone, and its expression in the 'United Irishmen' (1791). This organization rapidly acquired strength throughout the whole country, and though in the main recruited from Catholics, it succeeded in including a strong leaven of Protestants, notably amongst its leaders. Its programme was simple, to obtain under the British Crown, complete independence and equality of citizenship.

Agrarian disorder, however, was still rampant, especially in Ulster, where it reached its climax in a bloody fray in September 1795, between strong bodies of the Peep-of-Day and the Defender's respective fraternities, which ended in the defeat of the latter. The Protestants in Ulster, inspired by fears for their safety, no less than by determination to maintain their ascendancy, took this occasion to knit themselves together in a still closer union, by the creation of Orange Lodges, which embodied the Presbyterian elements throughout all Ulster. The policy of the lodges was more anti-Catholic than Protestant, more pro-Ulster than pro-British. For a long time to come, the Orange Association was one of the most potent factors in maintaining the spirit of Protestant ascendancy, a policy which involved as an inevitable corollary the suppression and pauperization of the Catholic rural population. A familiar phenomenon, the monotony of whose occurrence was rendered possible by the fact that maintenance of life was assured, no matter how devoid it was of amenities so long as there were enough potatoes in the cottier's crock to keep body and soul together.

Even the great demand for corn, which lasted throughout the Napoleonic wars, and the high price it commanded, failed to arouse the cottier and rescue him from the morass of poverty and squalor within which, trusting all too confidently in the potato for his subsistence, he was so firmly entrenched. Though the cottier was prepared to commit almost any deed of violence, in order to retain his hold on his cabin, and his potato patch, he was not easily roused to fight for fundamental political or religious rights. It was different with the Irish middle classes and

intellectuals: they felt keenly the weight and the shame of the penal laws. It was they who, now that the worst of the disabilities had been removed, were determined at any cost to complete their abolition. Hence it was that the next upheaval was political in origin and only took on an agrarian aspect when the military attacked the cabin and the croft.

Repeated failure to obtain the abolition of the remaining Penal Laws, and particularly that which deprived Catholics of their right to sit in the legislature, led the United Irishmen in 1796 to arm themselves and seek French aid. The latter materialized in two abortive attempts at invasion, one in 1796 and the other in 1797. In the spring of the following year, the authorities proceeded with success to disarm the malcontents, North and South, by means of the yeomanry, whose lawless violence exacerbated the feelings of Protestant and Catholic alike. The unrest which had been growing for seven years, and which affected the well-being of all classes, and the very existence of British ascendancy, burst into the active flame of rebellion on 24 May 1798. Within a month all was over, and the leaders dead or in exile. The scene of most of the fighting was in Leinster, and in particular at Wexford. 'The greater part of Ulster stood aloof. Connaught and Munster remained tranquil and the priests with some notable exceptions, took no share in the rebellion.'<sup>1</sup>

If Ulster was relatively quiet, she was evidently not unprepared. It was here that a great number of peasants were accustomed to foregather, it was said under the pretext of digging potatoes. In one case as many as 6,000 men had come together, as they averred, to dig some poor woman's potato-patch for her, a ruse which apparently did not deceive Sir G. Hill, who writes: 'The main object of the potato digging is probably to enable the leaders to ascertain how their men will act at the word of command.'<sup>2</sup> Hill may have been correct in his interpretation but, in fact, it was a well-established custom for neighbours to join in planting and harvesting the potatoes of those they held in high esteem, or of some poor widow who could not do it herself.

Whilst the 1798 Rebellion was more carefully prepared, and politically more dangerous than any of the risings of the preceding century, it disturbed to a far less degree the current of life and husbandry in the countryside. The suppression of the actual rebellion, the subsequent unlicensed pillage and massacre by the soldiery, and the savage reprisals of the peasantry, however, cost many thousands of lives. The ease with which the rebellion was quelled, and the lack of cohesion it displayed, together afforded a measure of the people's inherent lack of discipline and education, in the conduct of affairs and, more particularly, of their own government. The social life of the great majority of the people, to

<sup>1</sup> Gooch, G. P. (1907). *Camb. Mod. Hist.* vol. ix, p. 702.

<sup>2</sup> Lecky, W. (1892). *History of Ireland*, vol. III, pp. 475-6.

